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(71) Applicant: **Langen Packaging Inc.**
Mississauga, Ontario L5T 1Z2 (CA)

(72) Inventors:
• **Elent, Michael**
Ontario, L4J4W2 (CA)
• **Guttinger, Peter**
Mississauga, Ontario, L5T1Z2 (CA)

• **Wardell, Peter**
Ontario, L5T1Z2 (CA)

(74) Representative:
Webb, John Charles
Molins PLC
Group Patent Department
Haw Lane
Saunderton
High Wycombe, Bucks. HP14 4JE (GB)

(54) **Apparatus & method for inserting a flexible sheet in a container**

(57) Apparatus for insertion of at least one flexible sheet (12) into at least one container (60) comprises a sheet grasping surface (22) having a plurality of undulations on it which cause the effective width of a sheet maintained on the surface by vacuum ports (50) to be reduced, so as to facilitate insertion of the sheet into an aperture (60) in the container. Sheets (12) are provided to the sheet grasping surface (22) from a magazine by a pick and place device (24). The sheet grasping surface (22) is formed on a thin plate member (20) which is moved by conveyor belts (62) to slide the plate into the aperture (60) in the container, whereupon the sheet is released from the surface and remains in the container on subsequent retraction of the plate. Prior to insertion of the plate (20) the container (18) is located by a grasping device (52) which bends the container to expose the aperture (60). The apparatus provides for simultaneous insertion of several sheets in a corresponding number of containers. The containers may be video cassette containers or envelopes and the flexible sheets may be cardboard title inserts or letters respectively.

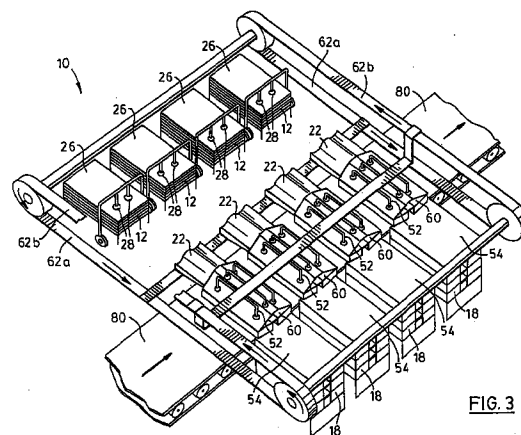


FIG. 3

EP 0 894 725 A1

Description

[0001] The present invention relates to the field of automated packaging and labelling, and more particularly to an apparatus and method for inserting a flexible sheet in a container.

[0002] Operations such as inserting a cardboard title sheet within a video cassette container so as to provide a cover label for a VHS video cassette contained in such container, or inserting a letter within an envelope, have in the past been done by hand (manually).

[0003] In particular, VHS video cassette containers are usually purchased in bulk quantities (with no cover title) by a video supplier who manufactures various video titles. Such manufacturer must insert a cardboard cover title in an aperture existing between the transparent wrapper surrounding the cassette container, and the container itself, in order that such cardboard insert accompany such cassette container and allow identification for the particular VHS video being sold in such container. Likewise, for placing unfolded letters or advertising in envelopes for subsequent mailing, the sides of the envelope need to be separated to allow insertion of the letter.

[0004] One of the reasons for up to now having to perform these tasks manually is due to the fact that the sheet being inserted within the container (ie VHS cassette container or envelope) is typically very nearly equal in width to the aperture in which it was to be inserted, and the slit (height of aperture) in which the sheet is inserted was very small and difficult to insert the sheet in. Enlarging the height of the aperture in the container by temporarily deforming the container to make it easier to insert the sheet necessarily reduced the width of the aperture to less than the sheet, thereby making it impossible to feed the sheet in the container unless the sheet was manually bent to allow it to fit in the temporarily deformed aperture.

[0005] Use of persons to manually accomplish these tasks required large numbers of persons, making this procedure not only labour intensive and accordingly costly, but also due to the inability to perform such task quickly in an automated manner, time consuming. Up until now, no inexpensive apparatus or method exists for automating this process.

[0006] Accordingly, a first aspect of the invention provides apparatus to allow automated inserting of a flexible sheet such as a cardboard title sheet or letter within a container such as a VHS video container or an envelope, comprising insertion means defining a support surface for said flexible sheet, including means for reducing the effective width of said sheet when the sheet is supported thereon and means for maintaining said sheet on said surface; means for locating the container to present an aperture therein; means for causing relative movement between the locating means and the insertion means so as to cause said support surface and flexible sheet supported thereon to be slidably posi-

tioned within said aperture; means for releasing said sheet from said surface; and means for causing relative movement between the located means and the insertion means so as to cause said surface to be removed from said aperture leaving said sheet in said aperture.

[0007] Preferably the means for reducing the effective width of the sheet includes at least one curved ridge or depression extending along an axis substantially parallel to a longitudinal axis of said support surface and extending substantially the length of said surface. The means for maintaining the sheet on the surface may include vacuum means applied from the surface. The container locating means may include means for grasping a container so as to expose the aperture: thus the container may be deformed to increase a critical dimension of the aperture.

[0008] According to another aspect of the present invention an apparatus for inserting a flexible sheet in a container provides for a sheet grasping surface for a flexible sheet, the surface of such sheet grasping surface advantageously having means (typically one or more corrugations thereon) to reduce the effective width of a flexible sheet when such flexible sheet is caused to adhere to such sheet grasping surface. In such manner the flexible sheet, of now-reduced width, may be more easily inserted into an aperture within the container. Means are also provided to grasp and bend the container so as to expose an aperture in the container to receive the sheet grasping surface and flexible sheet. Means are further provided for causing relative movement between the container and the sheet grasping surface so as to cause the sheet grasping surface and flexible sheet adhered thereto to be slidably positioned within the aperture, and for the sheet grasping surface to be slidably removed (minus the sheet which remains in the aperture).

[0009] According to a further aspect, the present invention provides for a thin plate member having a sheet grasping surface thereon. The sheet grasping surface has means thereon to reduce the effective width of a flexible sheet when a flexible sheet is adhered thereto. Pick and place means are provided for grasping the flexible sheet and placing it on the sheet grasping surface. Vacuum ports are provided on the sheet grasping surface to cause the flexible sheet to substantially adhere to the sheet grasping surface when a vacuum is applied to the vacuum ports. Grasping means are provided for grasping and bending the container to expose an aperture therein. Means are further provided for causing relative movement between the container and the sheet grasping surface, to allow the sheet grasping surface and flexible sheet adhered thereto to be slidably positioned within such aperture. Vacuum release means are provided to allow release of vacuum to the vacuum ports when the sheet grasping means is situated within the aperture, so as to allow the flexible sheet to be released in the aperture. The vacuum release means may include means for applying positive air pressure to

the vacuum ports to assist release of the flexible sheet. Alternatively, or additionally, mechanical stripping means could be used to prevent withdrawal of the flexible sheet with the sheet grasping surface. Lastly, means are provided for causing relative movement between the container and the sheet grasping surface to allow the sheet grasping surface to be slidably withdrawn from the aperture.

[0010] In a preferred embodiment, the means on the sheet grasping surface to reduce the effective width of the flexible sheet comprises at least one raised ridge portion, or an excavated depression, or a combination of the foregoing, each having a longitudinal axis parallel to the longitudinal axis of the sheet grasping surface, extending substantially the length of the sheet grasping surface. In such manner the apparatus of the present invention advantageously reduces the effective width of the flexible sheet to allow for insertion into an aperture of a container which is normally of a greater width, but due to bending thereof to increase the size of the aperture, is of a lesser effective width.

[0011] It is noted that in an alternative embodiment of the invention it is not necessary that a vacuum be applied to the surface of the sheet grasping member in order to cause the flexible sheet to conform to the contours thereof, although such is a preferred embodiment of the invention. Accordingly, in a less-preferred embodiment, another sheet grasping surface may be provided, having a surface of mirror-image to the first sheet grasping surface, so that the two surfaces when the flexible sheet is inserted between them and are pressed together, cause the flexible sheet to conform to the surface contours. In such manner use of a vacuum is not necessary.

[0012] Accordingly, in further aspect of the invention encompassing such less-preferred embodiment, the apparatus of the present invention for inserting a flexible sheet in a container comprises a thin plate member having a sheet grasping surface thereon, said sheet grasping surface having at least one corrugation thereon, said corrugation having a longitudinal axis parallel to a longitudinal axis of the sheet grasping surface and extending substantially the length of said sheet grasping surface; pick and place means for grasping said flexible sheet and placing it on said sheet grasping surface; means for causing said flexible sheet to substantially conform to said sheet grasping surface; grasping means for grasping and bending a container so as to expose an aperture within said container; means for causing relative movement between said container and said sheet grasping surface, to allow said sheet grasping surface and said flexible sheet when adhered to said sheet grasping surface to be slidably positioned within said aperture; and means for causing relative movement between said container and flexible sheet and said sheet grasping surface, so as to cause said sheet grasping surface to be removed from said aperture.

[0013] The present invention further provides for a

method of inserting a flexible sheet in a container, using the apparatus of either of the aforementioned embodiments. Accordingly, in one of its aspects, such method comprises grasping a flexible sheet; placing said flexible sheet on a sheet grasping surface, said sheet grasping surface having at least one corrugation thereon, said corrugation having a longitudinal axis parallel to a longitudinal axis of the sheet grasping surface; causing said flexible sheet to resiliently flex and substantially conform with and mutually overlie said sheet grasping surface; grasping and bending said container so as to expose an aperture within said container; moving said container and said sheet grasping surface and flexible sheet thereon relative to each other so as to slidably position said sheet grasping surface and flexible sheet thereon within said aperture; releasing said flexible sheet from conformance with and mutual overlying relation with said sheet grasping surface; and moving said container and flexible sheet and said sheet grasping surface relative to each other so as to slidably remove said sheet grasping surface from said aperture. Said releasing step may include the step of retaining the sheet in said aperture while slidably removing said sheet grasping surface.

[0014] The following drawings, showing by way of example only a preferred embodiment of the invention, are provided, in which:

Figures 1-4 each depict a perspective simplified view of an apparatus of the present invention, showing various sequential operations carried out by such apparatus;

Figure 5 is an enlarged perspective view of the container grasping and bending feature of the apparatus of the present invention employed to insert a flexible cardboard video title within the VHS container jacket;

Figure 6 is a perspective view of the VHS video container, with the cardboard cover title having been inserted into the aperture therein between the transparent wrapper and the video cassette container, by the apparatus of the present invention;

Figure 7 is a perspective view of one embodiment of the sheet grasping surface of the present invention, where vacuum ports are employed to cause the flexible sheet to conform to such surface;

Figure 8a is a cross-sectional view of the sheet grasping surface shown in Figure 7, taken along plane A-A, with a flexible sheet placed thereon;

Figure 8b is a similar cross-sectional view of the sheet grasping surface shown in Figure 7, taken along plane A-A, with a flexible sheet placed thereon and a vacuum applied to such sheet to cause it to conform to the contour of the sheet grasping member;

Figure 9 is a perspective view of two sheet grasping surfaces of the present invention, placed in mutual overlying relation and sandwiching therebetween a flexible sheet;

Figure 10a is a cross-sectional view of the two sheet grasping surfaces shown in Figure 9 taken along plane B-B, with a flexible sheet placed therebetween; and

Figure 10b is a similar cross-sectional view of the two sheet grasping surfaces shown in Figure 9, taken along plane B-B, with the two sheet grasping surfaces pressed together so as to sandwich the flexible sheet therebetween and cause it to conform to the contours thereof.

[0015] Figures 1-4 show apparatus 10 for inserting a flexible sheet 12 within a container 18, and in particular an apparatus 10 particularly suited for inserting a flexible sheet in the form of a cardboard cover title 12 in an aperture within a VHS video cassette container 18 intermediate a transparent vinyl or plastic exterior wrapper 14 extending around the outer periphery of such video container 18 and the container 18 itself. Although the drawings show the apparatus 10 adapted to insert a cover title 12 within a video cassette container 18, the apparatus 10 is equally suitable to allow insertion of a letter (not shown) within an envelope (likewise not shown). In such embodiment, the apparatus 10 simply uses magazines of letters and envelopes, with letters being substituted for the cover titles 12, and envelopes are substituted for the video cassettes 18. The method of operation for placing letters in envelopes is identical to that described below for placing cover titles 12 in cassettes 18.

[0016] Figures 1-4 show the apparatus 10 utilising the method of the present invention to simultaneously insert a cardboard cover title 12 in four VHS video cassettes 18. Obviously the apparatus 10 of the present invention may be modified to simultaneously fill more or fewer VHS cassette containers 18 than four in a single operation.

[0017] Figure 6 shows a VHS video cassette container 18 of the type which requires a cover title 12 to be inserted and which the present apparatus 10 is adapted to handle. In particular, Figure 6 shows a VHS video cassette 18 in the open configuration, having a cover title 12 inserted intermediate the plastic exterior wrapper 14 extending around the outer periphery of such container 18 and the container itself.

[0018] A detailed description of the elements making up the apparatus 10 shown in Figures 1-4 will now be made.

[0019] Apparatus 10 employs a reciprocating thin plate member 20, having a sheet grasping surface 22 thereon, on which cover titles 12 are placed by means of a "pick and place" means 24. Each pick and place means 24 selects, during each operation, one title cover 12 from a magazine 26 containing a plurality of such titles 12 stacked in mutual overlying relation one on top of the other. By means of suction cups 28 or other known devices, such as that disclosed in US Patent No. 5,156,387, the pick and place means 24 selects and

places one cover title 12 on sheet grasping surface 22. Sheet grasping surface 22, in a preferred embodiment as may be more clearly seen in Figure 7, possesses one or more corrugations 30 in the form of one or more ridges 32 and depressions 34. Each of such ridges 32 and depressions 34 have a longitudinal axis 40, parallel to the longitudinal axis 42 of the sheet grasping surface 22. In the preferred embodiment of sheet grasping surface 22, such ridges 32 and depressions 34 comprise, in a cross-section taken perpendicular to the longitudinal axis 42 of the sheet grasping surface a sinusoidal-shaped series of undulations as most clearly shown in Figures 8a and 8b.

[0020] Advantageously, the ridges 32 and depressions 34 cause the flexible sheet/cover title 12, of width "W", when caused to conform to the contours of such flexible sheet 12, to be reduced in width to an effective width " W_{eff} ", as shown in Figures 8b and 10b. Such reduction in effective width assists the flexible sheet 12 to be inserted in the container 18 when bent as shown in Figure 5, as will be more fully explained below.

[0021] In a preferred embodiment of the apparatus 10, the sheet grasping surface 22 possesses vacuum ports 50, which when a vacuum is applied cause the flexible sheet 12 to substantially conform to the sinusoidal contour of the ridges 32 and depressions 34 in the sheet grasping surface 22 (see Figure 7, and Figures 8a and 8b). The ports 50 are selectively connectable to a source of vacuum, and may also be selectively connectable to a source of positive air pressure. In another, but less preferred embodiment, which does not utilise vacuum ports 50, the sheet grasping surface 22 effectively comprises two surfaces 22 and 22', one a mirror image of the other as shown in Figure 9, and when pressed together as shown in Figure 9 the sheet 12 sandwiched therebetween is caused to conform to the contours of the sheet grasping surface 22, 22' (see Figure 10b) thus effectively reducing its width from "W" to " W_{eff} " as shown in Figures 10a and 10b.

[0022] Grasping means 52 are further provided in the apparatus 10 for grasping a selected one of a series of VHS video containers 18 loaded one on top of each other in a magazine 54. Such grasping means 52, which in the preferred embodiment comprises a plurality of legs 56 having suction cups 58 thereon, allow grasping of the exterior transparent cover 14 of the video cassette 18 as shown in Figures. Such legs 56 may cause the video cassette 18 to be grasped in the manner shown in Figure 5 so as to expose an aperture 60 thereon, or may physically bend the cassette container 18 so as to expose such aperture 60 between the transparent cover 14 and the container 18.

[0023] Means are further provided for causing relative movement between the container 18 and the sheet grasping surface 22 to cause the sheet grasping surface 22 and flexible sheet 12 adhered thereto to be slidably positioned within aperture 60, as shown in Figures 3 and 5. In the preferred embodiment such means com-

prises an endless band 62, with the sheet grasping surface 52 being coupled to a lower run 62a thereof, and with the grasping means 52 coupled to an upper run 62b thereof, as shown in Figures 1-4. Rotation of the endless band 62 in one direction causes each of the sheet grasping surfaces 22 and grasping means 52 to be brought together (Figures 2 and 3), and rotation in an opposite direction causes the sheet grasping surfaces 22 and grasping means 52 to be moved apart and back toward their respective magazines 26 and 54. (See Figure 4). In the preferred embodiment, to increase the speed of operation, both the sheet grasping surface 22 and the grasping means 52 moving in unison. However, it is only necessary that one move in relation to the other, and this could entail in a less preferred embodiment only the grasping means 52 moving and the sheet grasping surface 22 remaining stationary.

[0024] Operation of the apparatus 10 will now be described, with reference to the sequential steps of operation depicted in Figures 1-4 respectively.

[0025] Commencing at the start of a single sequence for inserting four flexible sheets 12 within four respective video containers 18 (Figure 1), each of four sheet grasping surfaces 22 are situated proximate respective magazines 26 filled with sheets (cover titles) 12. Simultaneously, four grasping means 52 are situated over respective magazines 54 filled with video cassette containers 18, placed in mutual overlying relation as shown in Figures 1-4. Thereafter, as shown in Figure 2, each of four "pick and place" means 24 then select a cover title 12 from a respective magazine 26 and place it on a respective sheet grasping surface 22. Flexible sheet 12 is caused to conform to sheet grasping surface 22 by sandwiching between two surfaces 22, 22' as shown in Figure 9, or by application of a vacuum to vacuum ports 50 located on the surface of sheet grasping means 22, as shown in Figures 2 and 8b. Sheet grasping surface 22 and flexible sheet 12 then begin moving away from magazines 26 towards grasping means 52, as shown in Figure 2. At the same time grasping means 52 each grasp a respective container 18 from a respective magazine 54 by means of the suction cups 58 located on legs 56 thereon. In doing so the transparent cover 14 is caused to be pulled away from container 18, thereby exposing an aperture 60 therein, as shown in Figure 2.

[0026] Thereafter, endless band 62 causes each of grasping means 52 and the grasped container 18, and the sheet grasping surface 22 and the flexible sheet 12 thereon, to move together, as shown in Figure 3. The sheet grasping surface 22 and flexible sheet 12 is accordingly inserted in aperture 60 in container 18, as shown in Figure 3, and in enlarged view in Figure 5.

[0027] Thereafter, the vacuum applied to the vacuum ports 50 is released and/or the ports 50 are connected to a source of positive air pressure (or the two sheet grasping surfaces 22 and 22' are separated as shown in Figure 8a, as the case may be), and the endless band

62 is reversed in direction. The sheet grasping surface(s) 22 are thereby removed from aperture 60, leaving behind flexible sheet (cover title 12) within aperture 60. Thereafter, the grasping means 52 release the containers 18, which then fall onto a moving conveyer belt 80, which conveys the video containers 18 with cover titles from the apparatus 10.

[0028] The above process is then repeated with another batch of four video cassettes, with the grasping means 52 moving toward magazines 54, and the sheet grasping surfaces 22 moving toward magazines 26 for respective supply of video containers 18 and titles 12.

[0029] As well as, or instead of, relying on release of vacuum (or supply of positive air pressure) at the ports 50 to effect release of the flexible sheet 12, a mechanically-operable stripper may be used, which engages and retains the trailing edge of the sheet at the appropriate time to prevent the sheet being withdrawn with the surface 22. The stripper could be carried by the grasping means 52 and moved into operative position to prevent withdrawal of the sheet 12 by means synchronised with the endless band 62 (or its drive means).

[0030] Although the disclosure describes and illustrates preferred embodiments of the invention, it is to be understood that the invention is not limited to these particular embodiments. Many variations and modifications will now occur to those skilled in the art. For definition of the invention, reference is to be made to the appended claims.

Claims

1. Apparatus for inserting a flexible sheet in a container, comprising insertion means defining a support surface (22) for said flexible sheet (12), including means for reducing the effective width of said sheet when the sheet is supported thereon and means (50; 22') for maintaining said sheet on said surface; means (52) for locating the container (18) so as to present an aperture (60) therein; means (62) for causing relative movement between the locating means and the insertion means so as to cause said support surface and flexible sheet supported thereon to be slidably positioned within said aperture; means (50) for releasing said sheet from said surface; and means (62) for causing relative movement between the locating means and the insertion means so as to cause said surface to be removed from said aperture leaving said sheet in said aperture.
2. Apparatus as claimed in claim 1, wherein the sheet maintaining means includes vacuum means (50) applied from said surface (22).
3. Apparatus as claimed in claim 1 or claim 2, wherein said locating means (52) includes means (58) for grasping a container (18) so as to expose said

aperture (60).

4. Apparatus for inserting a flexible sheet in a container, comprising a thin plate member (20) having a sheet grasping surface (22) thereon, said sheet grasping surface having means thereon to reduce the effective width of said flexible sheet (12) when said flexible sheet is adhered thereto; vacuum means (50) on said sheet grasping surface, adapted to cause said flexible sheet to substantially adhere to said sheet grasping surface when a vacuum is applied to said vacuum means; grasping means (52) for grasping said container (18) so as to expose an aperture (60) therein; means (62) for causing relative movement between said container and said sheet grasping surface so as to cause said sheet grasping surface and flexible sheet adhered thereto to be slidably positioned within said aperture; means for substantially releasing application of said vacuum to said vacuum means; and means (62) for causing relative movement between said container and said sheet grasping surface so as to allow said sheet grasping surface to be slidably withdrawn from said aperture.
5. Apparatus as claimed in any preceding claim, wherein said means to reduce the effective width of said flexible sheet (12) comprises at least one raised ridge and/or depression having a longitudinal axis parallel to a longitudinal axis of said surface (22), extending substantially the length of said surface.
6. Apparatus as claimed in claim 5, wherein said at least one raised ridge or depression has a curvilinear sectional shape.
7. Apparatus as claimed in claim 6, including at least one raised ridge and at least one depression comprising, in a cross-section taken perpendicular to the longitudinal axis of said surface (22), a sinusoidally-shaped ridge and a sinusoidally-shaped depression.
8. Apparatus as claimed in claim 2 or any of claims 4 to 7, wherein said vacuum means comprise a plurality of orifices (50) arranged in longitudinally-spaced configurations along substantially the length of said surface (22).
9. Apparatus as claimed in claim 8, wherein said means for substantially releasing application of said vacuum to said vacuum means causes lack of a vacuum to be applied to said orifices (50) thereby releasing said flexible sheet (12) from adherence to said surface (22).
10. Apparatus as claimed in any preceding claim, fur-

ther comprising means (52) for locating said container (18), after said surface (22) has been removed from said aperture (60), on a conveyor belt (80).

11. Apparatus for inserting a flexible sheet in a container, comprising a thin plate member (20) having a sheet grasping surface thereon (22), said sheet grasping surface having at least one corrugation thereon, said corrugation having a longitudinal axis parallel to a longitudinal axis of the sheet grasping surface and extending substantially the length of said sheet grasping surface; pick and place means (24) for grasping said flexible sheet and placing it on said sheet grasping surface; means (50; 22') for causing said flexible sheet to substantially conform with said sheet grasping surface; grasping means (52) for grasping and bending a container (18) so as to expose an aperture (60) within said container; means (62) for causing relative movement between said container and said sheet grasping surface, to allow said sheet grasping surface and said flexible sheet when adhered to said sheet grasping surface to be slidably positioned within said aperture; means (50; 22') for releasing said sheet from conformance with said sheet grasping surface; and means (62) for causing relative movement between said container and flexible sheet and said sheet grasping surface so as to cause said sheet grasping surface to be removed from said aperture.
12. Apparatus as claimed in claim 11, wherein said means for causing said flexible sheet (12) to substantially conform with said sheet grasping surface (22) comprises a plurality of vacuum ports (50) on said sheet grasping surface.
13. Apparatus as claimed in claim 11 or claim 12, wherein said corrugation comprises at least one raised ridge.
14. Apparatus as claimed in any of claims 11 to 13, wherein said corrugation comprises at least one depression.
15. Apparatus as claimed in claims 13 and 14, where at least one raised ridge and at least one depression comprises, in a cross section taken perpendicular to the longitudinal axis of said sheet grasping surface (22), a sinusoidally-shaped ridge and a sinusoidally-shaped depression.
16. Apparatus as claimed in any preceding claim, wherein said container comprises a video cassette container (18), and said flexible sheet is a printed cardboard sheet (12) for insertion intermediate a flexible transparent wrapper (14) on said video cassette container and the video cassette container

itself.

17. A method of inserting a flexible sheet in a container, comprising grasping a flexible sheet (12); placing said flexible sheet on a sheet grasping surface (22),
said sheet grasping surface having at least one cor-
rugation thereon, said corrugation having a longitu-
dinal axis parallel to a longitudinal axis of the sheet
grasping surface; causing said flexible sheet to
resiliently flex and substantially conform with and
mutually overlie said sheet grasping surface; grasp-
ing and bending said container (18) so as to expose
(60) an aperture within said container; moving said
container and said sheet grasping surface and flex-
ible sheet thereon relative to each other so as to sli-
dably position said sheet grasping surface and
flexible sheet thereon within said aperture; releas-
ing said flexible sheet from conformance with and
mutual overlying relation with said sheet grasping
surface; and moving said container and flexible
sheet and said sheet grasping surface relative to
each other so as to slidably remove said sheet
grasping surface from said aperture.
18. A method as claimed in claim 17, said step for
causing said flexible sheet (12) to conform with and
mutually overlie said sheet grasping surface (22)
comprising applying a vacuum to vacuum ports (50)
within said sheet grasping surface.
19. A method as claimed in claim 18, said step for
releasing said flexible sheet (12) from conformance
with and mutual overlying relation with said sheet
grasping surface (22) comprising stopping applica-
tion of said vacuum to said vacuum ports (50).

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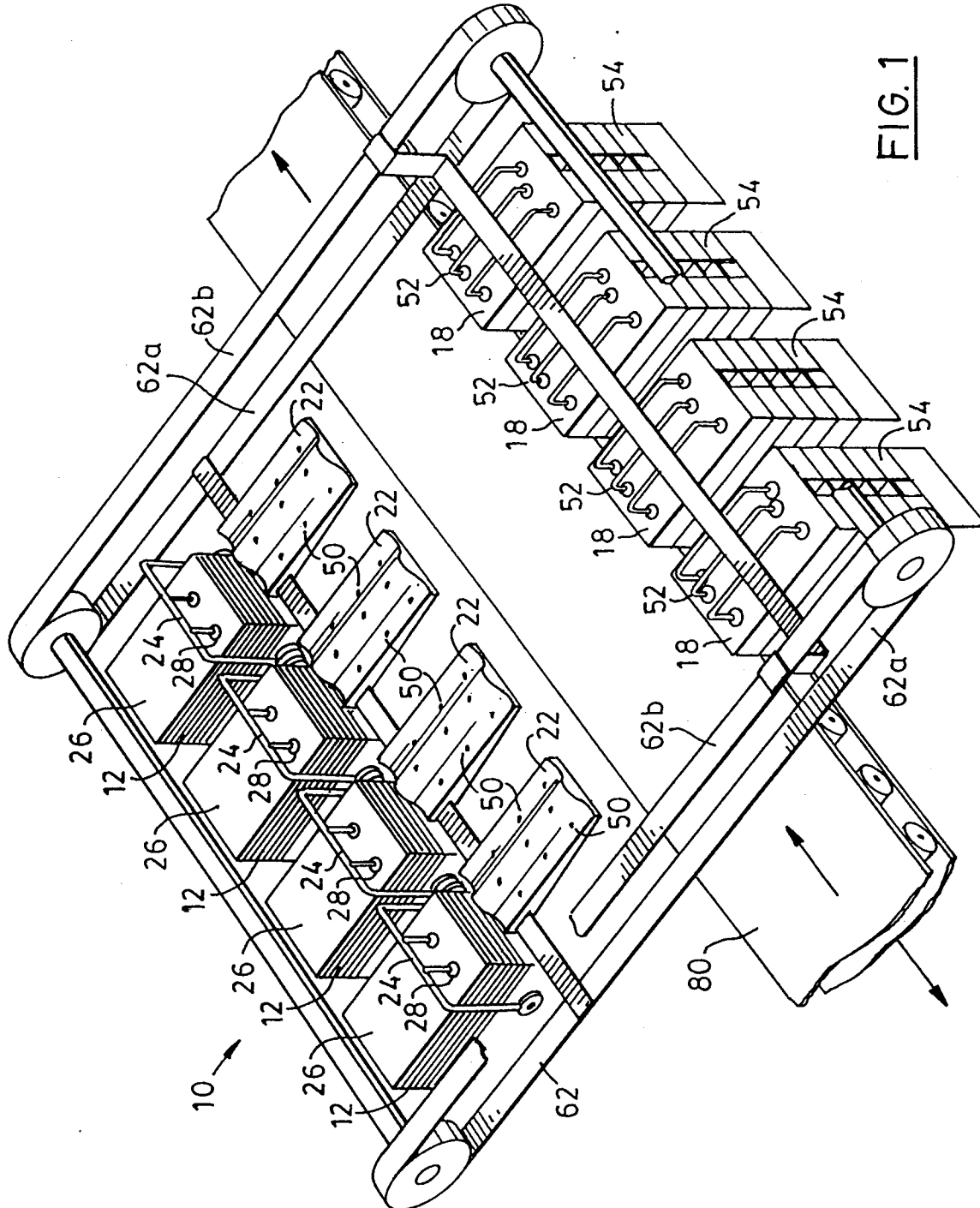


FIG. 1

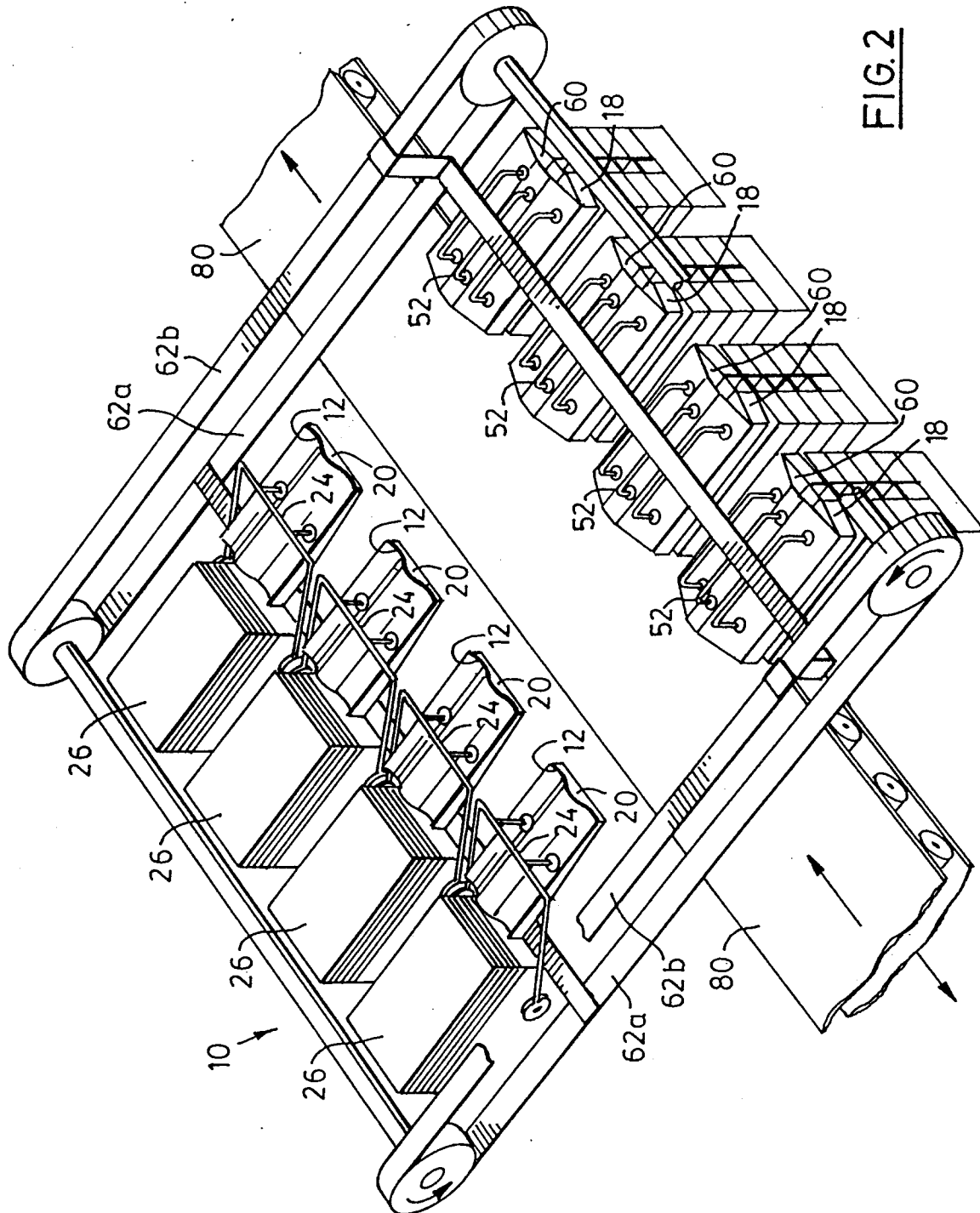


FIG. 2

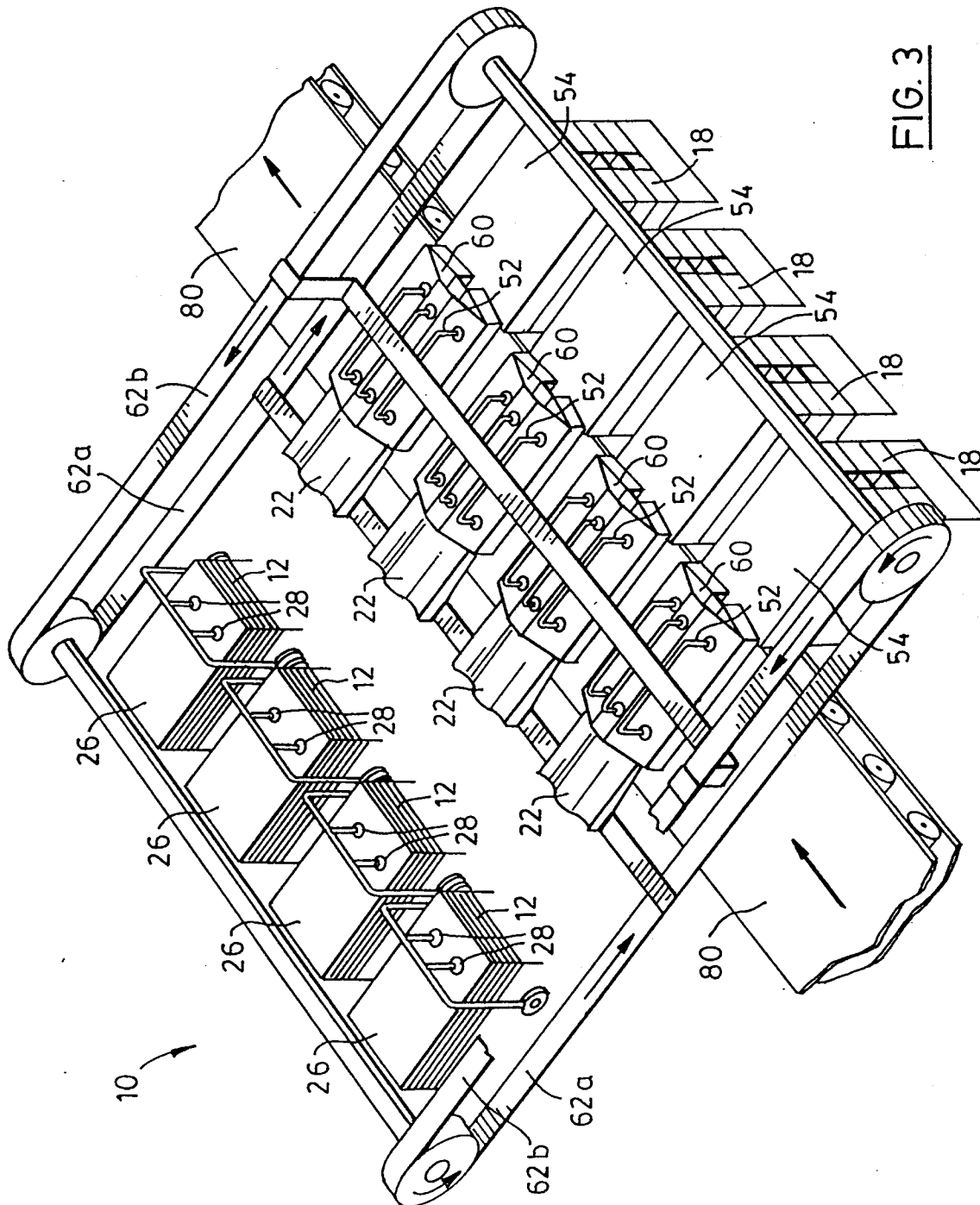
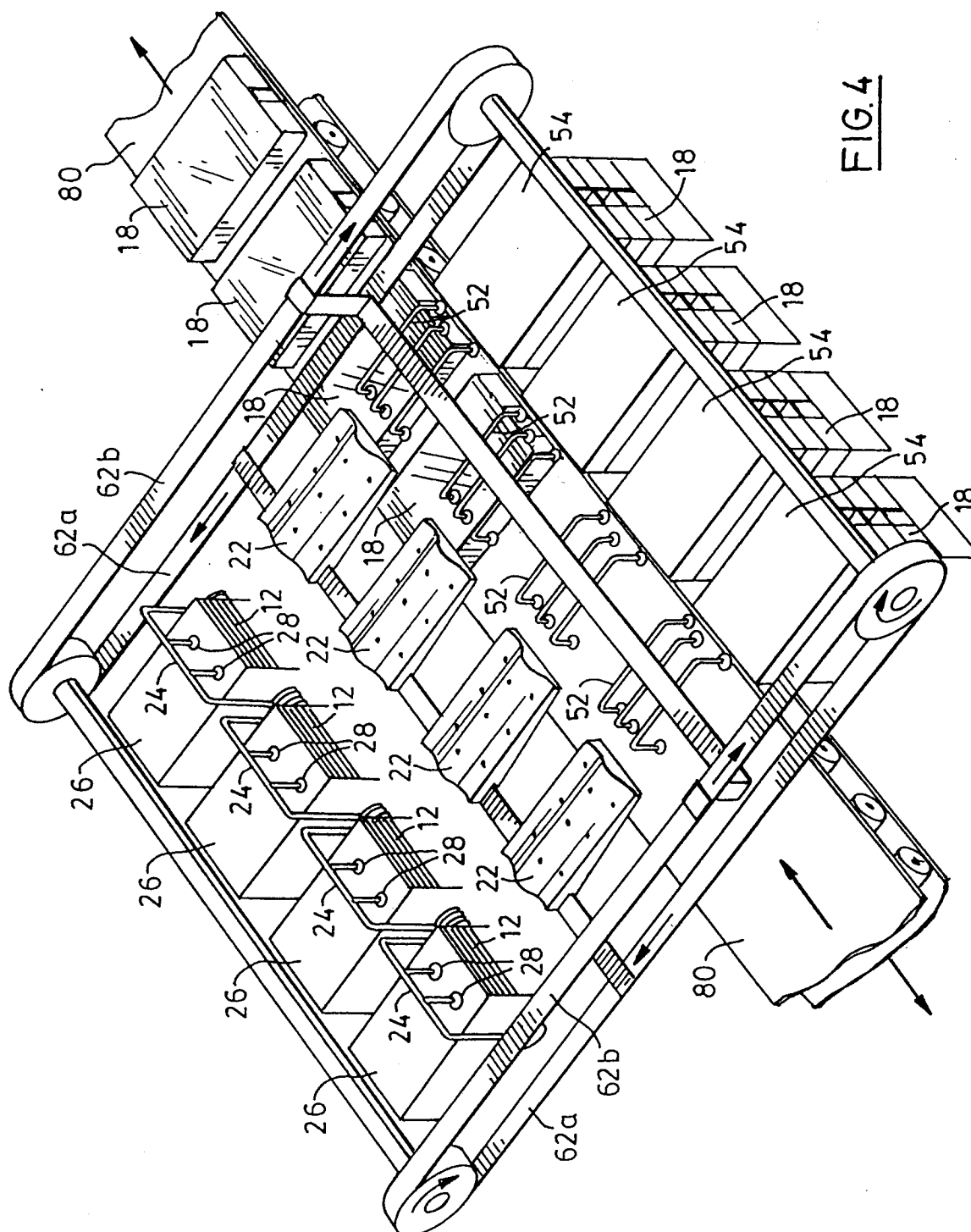


FIG. 3

FIG. 4

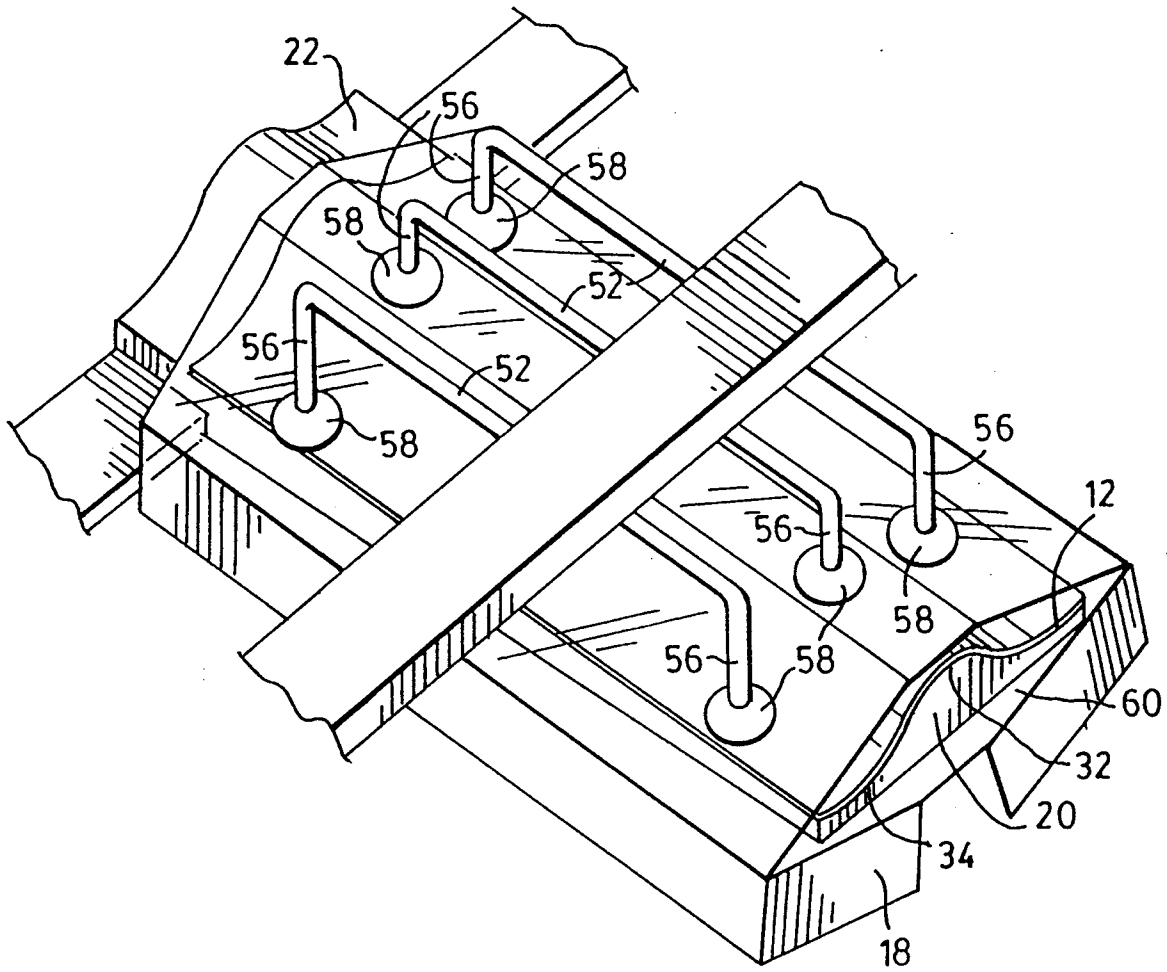
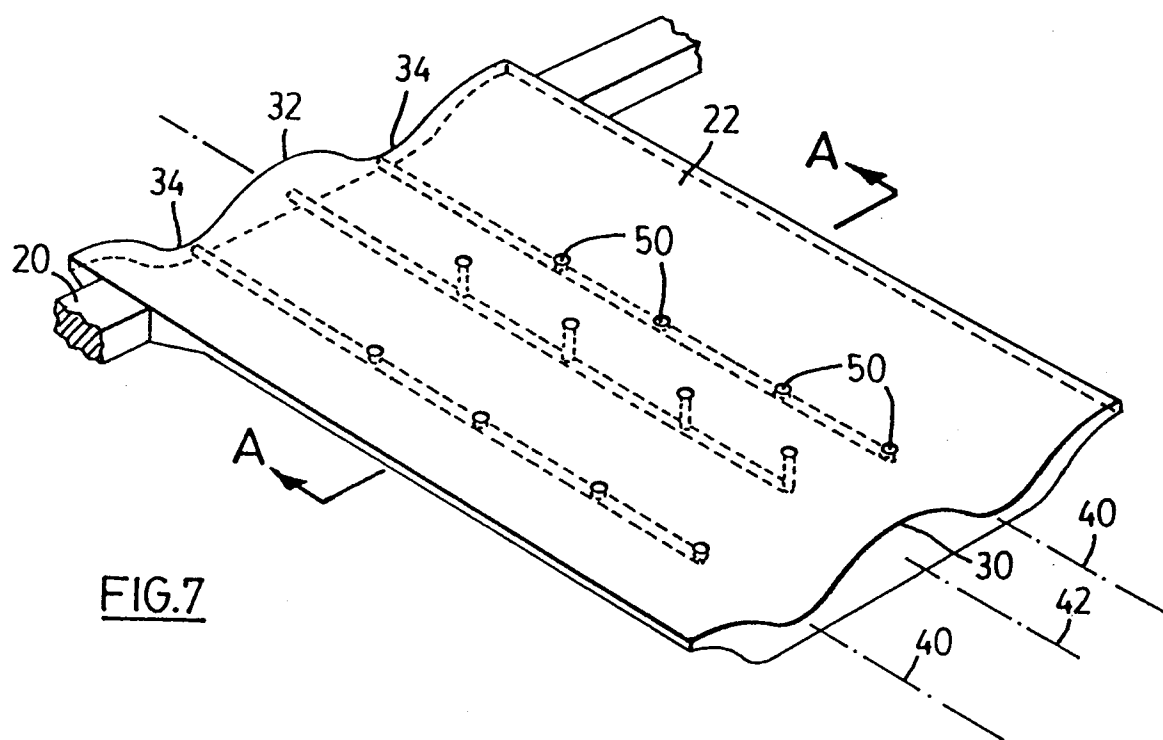
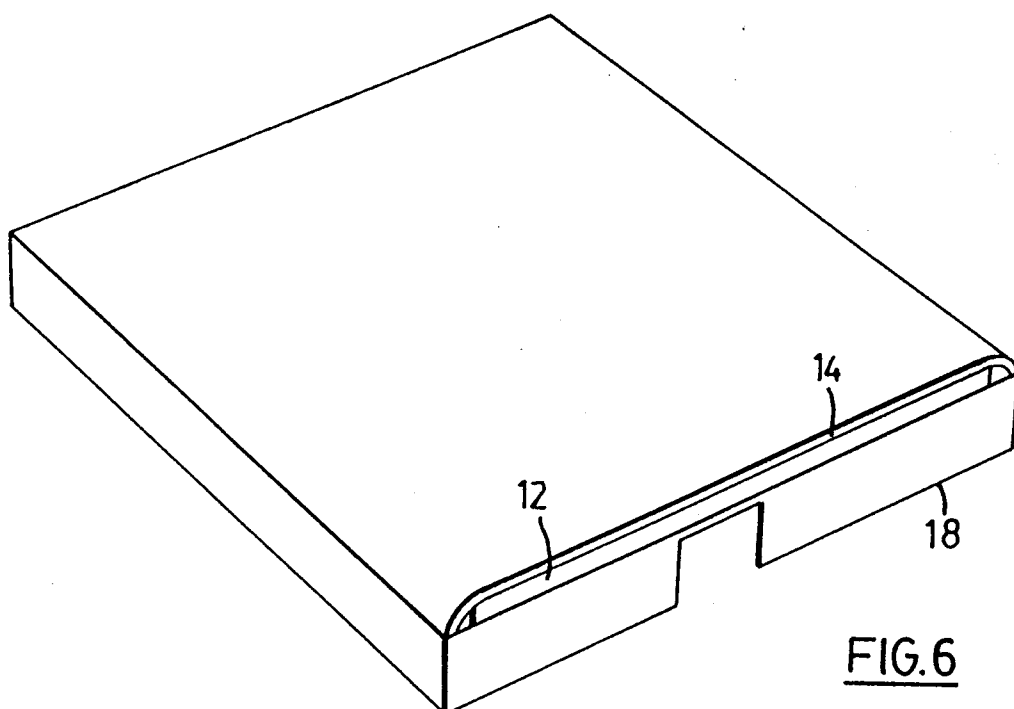
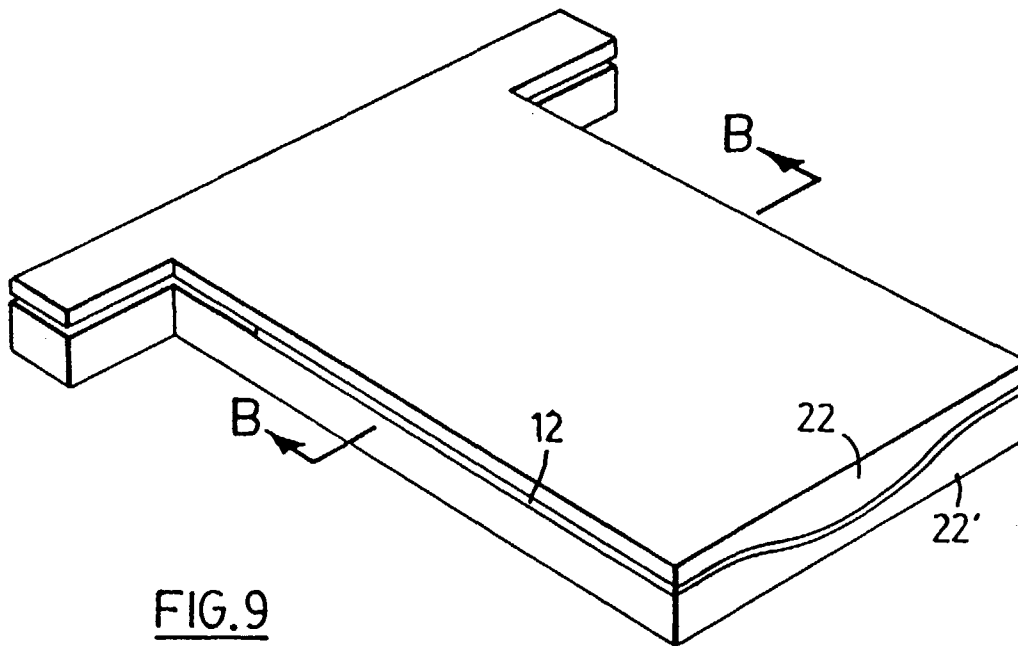
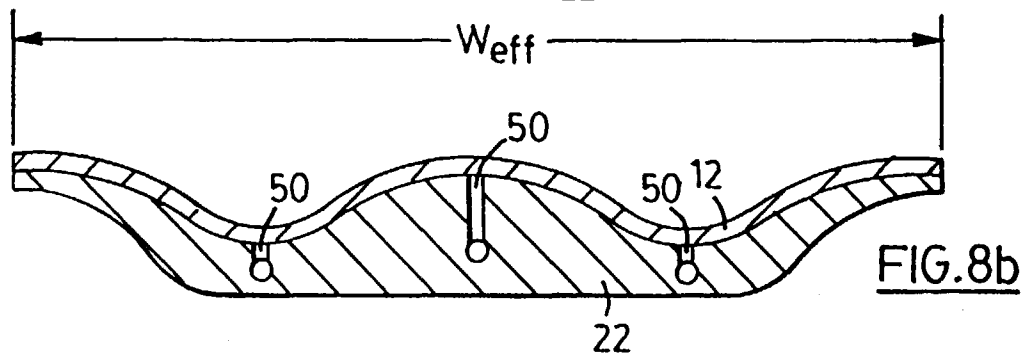
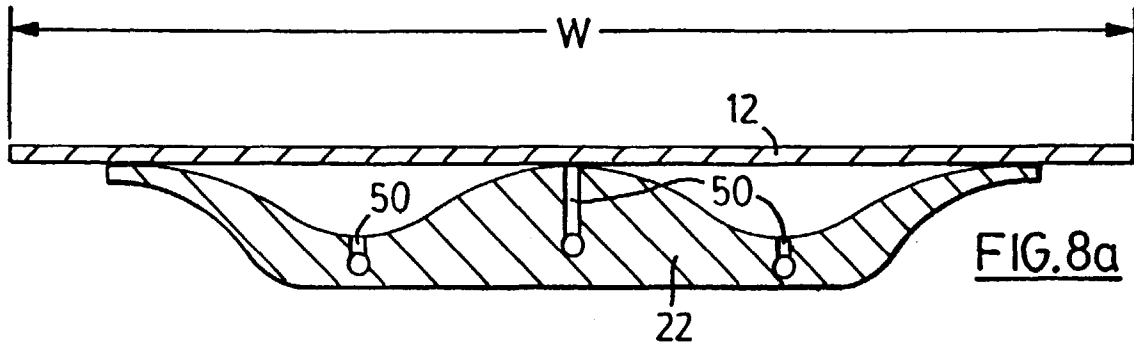


FIG. 5





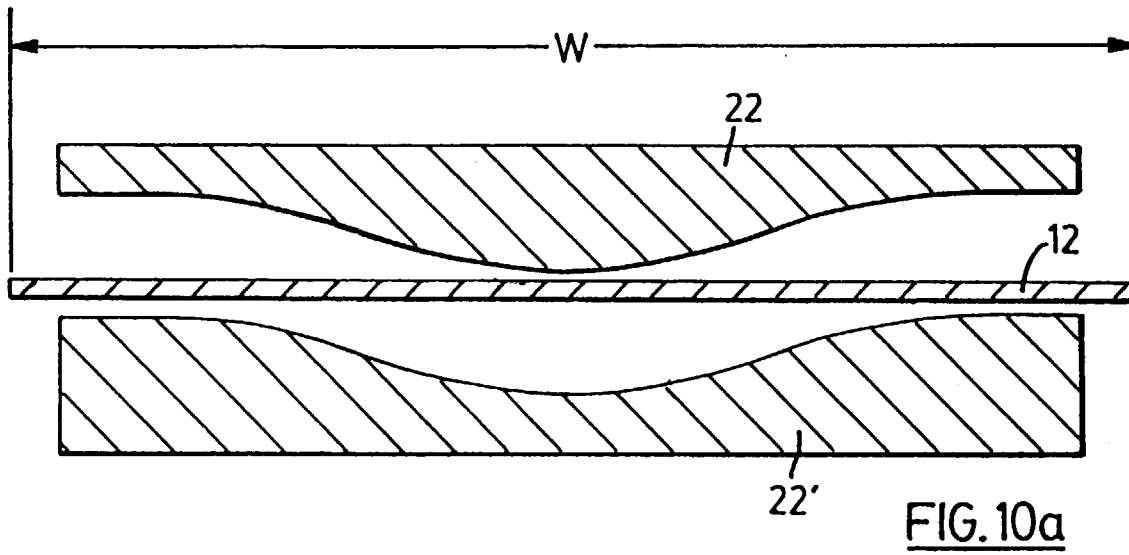


FIG. 10a

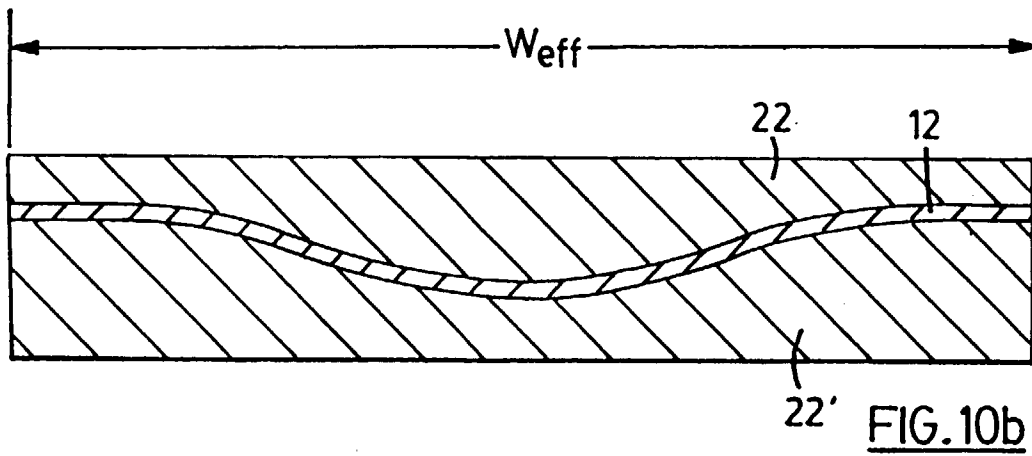


FIG. 10b



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 30 5695

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB 2 246 549 A (TRONICCORD)	1, 3, 11, 13-17	B65B61/20 B65B25/00
Y	* abstract *	2, 4-9, 12, 18, 19	
	* page 9, paragraph 3 - page 11, paragraph 2; figures 3, 7-10 *		

Y	WO 93 10002 A (ZANIBONI)	2, 4-9, 12, 18, 19	
	* page 14, line 23 - page 15, line 8; figures 13, 14, 18 *		
	* page 9, paragraph 6 *		

			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		6 January 1998	Claeys, H
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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